Causality and Human Nature in the Social Sciences

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1. Introduction

It would be hard to find a more fundamental concept for the social sciences than human nature. The social sciences are, after all, about *human* societies, so they had better have some idea what the constituents of such societies are like. But the issue central to the present paper is whether human nature is something that the social sciences presuppose, an exogenous input from some other part of the intellectual map, or whether it is rather the subject matter of the social sciences, something that the social sciences aim to illuminate. Or, and here is where I shall suggest the truth lies, perhaps it is not quite either, but human nature is a concept that can only adequately be understood from multiple perspectives, some, but not all, of which form parts of the social sciences. The other topic of this paper, causality, is fundamental to explaining this last point, as will emerge, I hope, as the paper develops.

The reason that there has been a question about the role of human nature in recent years is that there has been an active and influential movement to insist that this was a question entirely, or almost entirely, outside the social sciences, somewhere on the boundary between biology and psychology. A natural, if ultimately arbitrary, point to date the beginning of this movement is with the publication in 1975 of E. O. Wilson's *Sociobiology*, and the heated controversy that followed this event. Wilson famously suggested in this work that the extension of evolutionary biology he was advocating would lead to the 'cannabilization' of the social sciences and ethics, as human behaviour, both social and individual, was increasingly understood as an elaborate set of fitness-maximising devices.

This reductive vision was rightly subject to severe criticism (Lewontin, Kamin and Rose 1984; Kitcher 1985), firstly because of its scientific inadequacy, but also because of its unsavoury potential social and political implications. But for two reasons this is hardly the end of the story. First, as I shall describe in a moment, the same basic ideas emerged soon after in a slightly different guise. But second, the extreme reaction to the sociobiological picture, reductive environmentalism, is no improvement. Indeed the latter may be the position with the more disastrous potential implications. Biological determinism suggests political nihilism, as attempts to alter the natural biological state of human life must ultimately be futile. But environmental determinism suggests a plasticity of human nature that may legitimate any political system, however repellent it may seem to us, now. Worker bees, one assumes, do not yearn for the freedom to choose their way of life and nor would we if our upbringing and social milieu had properly conditioned us to the lives of slaves.

The remainder of this paper will take on three tasks. The first will be to describe the successor project to sociobiology and briefly point out some if its major weaknesses. The second will be to sketch a more adequate view of the relation between biology and society in the development of human nature. And finally I shall say something more contentious about the way this positive view presents a possible view of human freedom. This will also make clearer the vision of causality that, I believe, makes most sense of the problem addressed in the second part.

2. From Sociobiology to Evolutionary Biology.

As mentioned above, sociobiology slipped out of view during the early 1980s, in part in response to some severe criticism. However, something similar re-emerged in the latter half of that decade, rebranded as Evolutionary Psychology[1]. There is considerable debate as to how much this scientific venture differed from its predecessor. The official story is that sociobiology had ignored a crucial link between evolution and behaviour, the cognitive mechanisms that had evolved to produce appropriate behaviour in response to environmental information (Cosmides and Tooby 1987). It seems unlikely that Wilson had been unaware of the necessity of some kind of cognitive mechanism or, to put it differently, of the distinction between

[1] Following Buller 2005, I capitalise Evolutionary Psychology to refer to the specific and influential school discussed here, and associated especially with John Tooby, Leda Cosmides, and David Buss. Classic statements are Barkow, Cosmides and Tooby 1992 and Buss 1999. In lower case, I mean by evolutionary psychology any attempt to understand how it is that humans came to have (evolved) the mental capacities they now exhibit. Provided the latter project does not assume a specific and controversial understanding of evolution, it is of course unexceptionable.

proximate (neurological) and ultimate (evolutionary) causes[2]. However, there is no doubt that Evolutionary Psychologists devoted more attention to this intervening entity, and this led to an aspect of their account of the mind that I want to stress, what I refer to as its atavistic character[3].

Evolved cognitive mechanisms are devices evolved to respond to problems organisms face in surviving and reproducing. But exactly which problems will these be? Clearly they will not necessarily be the problems that the organisms are currently facing: evolution is not an instantaneous process. In fact, one of the most distinctive features of Evolutionary Psychology was the quite specific answer it gave to this question: human cognitive mechanisms evolved in the Pleistocene, the period from about 2m years ago, to about 10,000 years ago, the end of the last ice age. Motivating this choice is the thought that substantial periods of time are required for significant evolutionary change, and the Pleistocene is conceived of as a sufficiently extended period with reasonably constant conditions to which human life could adapt. It is also the most recent such period, and therefore an appropriate era during which to look for characteristics that distinguish humans from other lineages from which they have diverged, most recently the great apes. Much of evolutionary psychology has consisted of reflection on the conditions that might have obtained during this period, and on the behaviours that would have been most favoured by natural selection given those conditions. This has been more or less supplemented by empirical investigations aiming to show that the appropriate behaviours have, indeed, evolved.

There are, unfortunately, many problems with this line of thought. To begin with, knowledge of the conditions in the Pleistocene is a lot less certain than one might wish and, more importantly, those conditions were probably far from stable. It has been argued that the safest inference from the Evolutionary Psychologists' assumptions would be that human psychology should be enormously flexible to take account of this variability. But even if we did know as much as we cold wish about the Pleistocene, including that the relevant conditions there were highly stable, the procedure in question would be highly dubious. First of all, a lot of human behaviour

[2] This distinction was made famous by Ernst Mayr (1961).
[3] I shall concentrate my criticism of Evolutionary Psychology on this point. This is far from exhausting the difficulties the position faces. For more comprehensive criticism see Dupré 2001, Buller 2005. I explain the present objection in more detail in Dupré 2008.

has roots that are far more ancient, and that are shared with many of our not even very close relatives. Sociability, for instance, is not a uniquely human attribute, though its detailed implications may be different in humans than in other animals. But then, second, the assumption that significant evolutionary change must have taken at least hundreds of thousands, perhaps millions of years, is also questionable. This latter assumption is based on a model of evolution as change in gene frequency resulting from selection of advantageous alleles. But significant changes in the nature of human sociality are evident over historical periods of tens or hundreds of years, presumably because they are due to cultural, or possibly epigenetic, processes. Why should similar processes not also facilitate the evolutionary divergence between humans and non-human relatives?[4]

I mentioned that Evolutionary Psychologists attempt with varying degrees of commitment to provide empirical backing for the hypotheses derived from reflections on the Pleistocene. It should be stressed that empirical support is being sought for universal claims about human psychology. There is some room for explanation of diversity in human behaviour through appeal to different environments in which people grow up, and specific differences in the experiences of individuals. But the object of interest is what is common to all humans: human nature. There are, certainly, worthy motivations for a concern with universal human nature, for example it may serve as a ground for rejecting racist views that claim deep differences between groups of humans. On the other hand, evolutionary psychologists do make a lot of the differences between the sexes; from an evolutionary perspective it is certainly a highly salient one. The historical message seems to be that with sufficient ingenuity views about human nature can be deployed on either side of most political issues[5]. However, the Evolutionary Psychologists' treatment of sexual difference does point to deep theoretical difficulties with their general position.

[4] Limitations to the neo-Darwinist view of evolution assumed by Evolutionary Psychology are discussed in Dupré 2010.

[5] The political versatility of scientific findings is illustrated in some detail in the second half of Barnes and Dupré 2008 with respect to genetics and genomics. What we describe there as 'astrological genetics' the vulgar view that sees details of human behaviour ineluctably inscribed in genes, would be difficult to deploy in a politically progressive way. There is probably no reputable scientist who believes the extreme vulgar view, though it is easily read into a lot of popular writing, not least by Evolutionary Psychologists, and it is often implicit in casual statements by scientists extolling the importance of their fields.

The notion that there is no difference at all between the human sexes except what local conventions of gender dictate has largely been abandoned, and this is probably a good thing. It is an unhelpful view because it represents exactly the veering to reductive environmentalism that I mentioned above. There are, of course, biological differences between men and women. The trouble is that although Evolutionary Psychologists claim that their theories are interactive—the psychological modules we all share determine behaviour in ways responsive to and hence appropriate for environmental circumstances—their evolutionary arguments are presented in terms of universally optimal behaviour for humans, for males or for females. Moreover, the dispositions that humans develop through their lives are universal. If humans universally have a tendency to reciprocate cooperative behaviour, let us say, and to punish selfish behaviour, the interaction is only at the point of detecting an instance of cooperation or selfishness and then behaving appropriately. Development, the process of becoming a mature human with a particular set of responses to contingencies in the world, turns out to be irrelevant. A proper interactionism, on the other hand, does not merely involve appropriate interaction with various environmental contingencies, something that probably characterises every life form on the planet, but rather refers to development that produces different mature phenotypes in response to different environments. This much is also true of many organisms, perhaps most strikingly plants. What is developed to a unique degree in humans is the ability to develop a cognitive phenotype, a set of cognitive mechanisms, if you like, that is adjusted to the environment in which it matures. And this is something that the evolved cognitive mechanisms of the Evolutionary Psychologists are wholly unable to comprehend. So I now turn to a view of evolution that is better fitted to this task.

3. From Evolutionary Psychology to Developmental Systems Theory

Evolutionary Psychology, as I have tried to explain, is ultimately committed to a view of development that sees the basic parameters of cognitive systems as somehow inscribed in our DNA. One reason that it does this, to which I have already alluded, is that it is still very much mired in the assumption central to neo-Darwinist thinking, that the products of the evolutionary process could only be preserved in the long term if they were entrusted to the care of the genome, to Dawkins's 'immortal coils'

(1976). This assumption has little to be said for it, however. Genes are by no means the only vehicles by which information about development can be passed down from one generation to the next, and it is far from clear what degree of stability—immortality—is required for such a mechanism of heredity to function in an evolutionary process. Three generally interconnected processes that have come under recent investigation and that illustrate the limitations of traditional gene-centred neo-Darwinism are epigenetic inheritance, transgenerational niche construction, and cultural evolution. I shall next say a little about each of these.

3.1 Epigenetics

Epigenetics embodies a fundamental reevaluation of the ways that genes work. Genomes are constantly undergoing chemical modifications through interactions with the cellular environment. Most well-known of these is methylation, the alteration of cytosine, one of the bases that make up the famous genetic code, by the addition of a methyl (CH_3) group. Other epigenetic processes modify the protein core that forms part of the structure of the chromosome. Methylation generally reduces the probability that the sequence of DNA in which it occurs will be transcribed, thus changing the overall output of RNA transcripts from the genome. Processes of this kind help to explain the different behaviour of genetically identical cells in the different parts of the bodies of multicellular organisms. The crucial implication of the expanding understanding of epigenetic phenomena is that it finally lays to rest the idea that the nature and behaviour of an organism was somehow inscribed in the sequence of nucleotides in its nuclear DNA. It is now clear that this sequence provides no more than a (vast) set of chemical possibilities; what is actually done even in terms of the transcription of RNA molecules, depends on a further level of chemical modification, and one that is far more transitory than DNA sequence.

Contrary to an earlier belief that at least only DNA sequence was passed on to subsequent generations, it is increasingly clear that some epigenetic changes can be inherited too. Striking illustrations of this kind have emerged from the UK Avon Longitudinal Study of Parents and Children (ALSPAC), a project involving 14 000 mothers enrolled during pregnancies in 1991 and 1992. The findings of this project have included a correlation between smoking by men prior to puberty and obesity in their male offspring, and—bizarrely—an inverse correlation between the availability of food for men in childhood, and the longevity of their grandsons (but not granddaughters) (Pembrey et al. 2005) . Although it is difficult to assemble conclusive evidence, such results add to the plausibility of the long held suspicion that descendants of victims of the Dutch Hunger Winter of 1944-5 showed symptoms such as low birth weight, and that these were the consequence of epigenetic inheritance.

It is also important that epigenetic inheritance need not involve the direct transfer of molecules between generations. A fascinating illustration of this point can be found in the research on maternal behaviour in rats by Michael Meaney and colleagues (Champagne and Meaney 2006). It appears that attentive mothering by rats, involving a lot of licking of rat pups, produces calmer, less nervous adult rats, and that this is a consequence of epigenetic effects in the developing rat brains initiated by maternal care. These calmer adults, if female, are likely to lick their pups more. Hence the epigenetic changes to the rat's brain can be passed on by means of a process involving behaviour alterations between parent and child.

Another important point about this example is that it illustrates the fact that environmental influences on the organism can produce epigenetic changes, another crucial idea in developing a picture of development that goes beyond simplistic genetic determinism. A disturbing example of this point is provided by the growing evidence that assisted reproductive technologies, by providing an abnormal developmental environment at a crucial point in embryonic development, can have epigenetic effects that may produce disease. These certainly include rare disorders known to be epigenetic, and it is increasingly suspected that these technologies substantially increase the risks of diabetes and obesity in later life (Pembrey 2010). More speculative is the thought that the realisation that the environment can affect the behaviour of genes and can do so in ways that may be heritable, raises the spectre of Lamarckian processes in evolution. This is an issue I shall not pursue here however (but see Jablonka and Lamb 1995).

3.2. Niche Construction

It is still often supposed that there exist niches in nature, and organisms evolve to occupy them. On the other hand it has been known, at least since Charles Darwin's extensive and classic investigations of earthworms (Darwin 1881), that organisms can have a profound influence on their environments, and can do so in ways that are beneficial or essential for their ways of living. Of particular importance is the fact that the niche that the organisms construct is the environment in which subsequent generations develop. Thus, as opposed to the niche being a pre-existing space to which natural selection adapts a group of organisms, the organisms come to be adapted to the environment that its members have constructed, in part because that environment provides some of the conditions that enable them to develop in an appropriately adapted way. I shall therefore sometimes refer to the constructed niche as a developmental niche. Classic examples of niches both constructed and developed are provided by the beaver, the entire life of which focuses on the resources provided by the dam that it itself constructs, and the termite, whose mounds are remarkable achievements in climate control and much else. But these are only extreme examples. It is increasingly acknowledged that niches are not pre-existing givens, but rather co-evolve with the organisms that inhabit them (Odling-Smee, Laland and Feldman, 2003). And surely the organism that has taken this phenomenon to the highest level is *Homo sapiens*.

From certain perspectives one may admire the climate regulation system of a termite mound more than the energy-guzzling air conditioning systems that keep the inhabitants of Los Angeles or Hong Kong comfortable on hot days, but it would be hard to deny that the latter constitute even more complex systems, and ones that would not have been possible without the unique cognitive endowments of the human species. More fundamental to human development, on the other hand, are the hospitals in which most of us are now born, and which contribute to the extensions of our life spans, and the schools that provide us, over many years, with the skills necessary to negotiate successfully the enormously complex material and social environments we construct. No one could be tempted to imagine that a human infant raised in the wild by non-humans would acquire these skills by sheer force of genome.

One way of thinking about these phenomena is through Richard Dawkins's (1982) notion of the extended phenotype. On Dawkins's view, a termite's genes don't just build termite bodies, they build termite mounds by determining the behaviour of termites that results in the building and maintenance of mounds. It should be noted that this provides a very different causal path between the generations from the familiar idea of a genome directing the development of an organism. For one thing, it is evidently impossible for a termite to build a mound by itself, so that the termite genome is at best only part of a much larger system that in its entirety provides the conditions for the production of new termites. My own view is that the differences are greater than the similarities, and Dawkins's way of describing things is likely to mislead more than it enlightens. But I don't need to pursue that argument here, since the focus will remain on the human case. And no one could suppose that the environment that humans create for, among other things, the production of new humans, is simply a consequence of genetically determined human behaviour. The point is probably too obvious to require argument. It is sufficiently established, for example, by the diversity of human environments. Of greatest interest here, and one of the central explanations for that diversity, for the particular ways in which particular groups of humans shape their environments, is cultural evolution. To this I now turn.

3.3 Cultural Evolution

That culture can generate processes similar to biological evolution has been a familiar idea for a long time. Recent discussions generally date from the sometimes rather technical analyses of Feldman and Cavalli-Sforza (1981) and Boyd and Richerson (1985). The basic idea is that elements of culture are transmitted from one human to another, and if the cultural item is beneficial to its possessors it will tend to be passed on more often and become more common. This deliberately vague summary covers many possibilities. Transmission may be from parents to offspring, but it certainly need not be: transmission from teachers to students or between peers is perhaps equally or more common. 'Beneficial' could be interpreted in a way analogous to biological evolution as promoting survival and reproduction, but it also need not be. It might just mean something the possessor enjoys, or it may be pleasurable or otherwise advantageous to transmit it. Cocaine use probably doesn't increase reproductive success, but the habit appears to be easily picked up, and the economic context of many contemporary societies tends to generate a subset of users with a strong interest in finding new recruits to the practice. The sources cited above offer a range of different plausible and even empirically supported dynamics for the evolution of various cultural items.

Another approach that has received a good deal of attention starts rather from the perspective of the cultural element itself. I refer to so-called memetics (Blackmore1999, following Dawkins 1976). Here the idea is that there are certain cultural items, 'memes', that are very good at getting themselves transmitted from one human mind to another, and human minds thus end up being colonised by the most successful such memes. Although this perspective can provide some illumination in particular cases, as a general approach to cultural evolution it is highly simplistic, and not surprisingly it shares many of the defects of simplistic gene-centred approaches to biological evolution. For example, it has become increasingly clear that the division of genomes into a specific number of distinct genes is a human imposition rather than a reflection of the nature of things (Barnes and Dupré 2008). That culture does not exist as an objectively determined set of discrete elements is far more obvious.

The last remark points to some very serious issues that I have glossed over. My talk of cultural elements or items above is no more justified than the assumption that culture can be divided into memes. Indeed, and worse, I have written as if it was unproblematic what the word 'culture' refers to, and certainly this is not the case. Fortunately, I do not think it is necessary to go into any of these difficult questions here. All I want to insist on now is that a wide range of behaviour transmitted between human individuals, including from more mature to juvenile individuals, is part of the set of resources involved in the successful development of human individuals. I have wanted to indicate that there are interesting questions to be asked about the processes by which this behavioural repertoire changes over time, though I certainly do not want to commit myself to the view that this is best studied in terms of formal models, or indeed that all such phenomena are amenable to such study at all. Given only this very general assertion, it is possible to see how far the human developmental system differs from that implicitly assumed by evolutionary models limited to an obsessive focus on the genetic.

3.4 Developmental Systems

The point I have been making is in many ways an obvious one: the successful development of a human takes the confluence of a considerable variety of resources. These include a great deal that is provided by other humans, some through direct interaction, many more through the construction of the environment in which contemporary human life is possible. There are also, of course, many biological conditions. Although one may say that first among those is a zygote with an appropriate and not fatally corrupted genome there is much more. The zygote and the developing embryo and fetus undergo a series of interactions with the environment provided by the mother's body, and the influence of this environment is to some extent affected by the wider environment in which the mother herself is placed. All of this makes nonsense of the idea that somehow the future adult human is inscribed in the zygotic genome, if only we had the ability to read it. Although few contemporary theorists assert so crassly the preformation of the adult in the genome, many implicitly or explicitly assume more of this picture than is defensible.

The appreciation that evolution can act on many different aspects of the developmental system is another way of seeing the inadequacy of Evolutionary Psychology. Most obviously this is illustrated by cultural evolution—the clue, after all, is in the name. Cultural evolution has surely had a great deal to do with the very different phenotypes (behavioural, at any rate) exhibited by contemporary humans and their ancestors a few centuries ago, and indeed between those exhibited in (say) New York City, rural England, and the forests of New Guinea. Genetically-minded evolutionists are inclined to respond that cultural differences are easily mutable, and hence superficial. And it is true that an infant born in rural England or even New Guinea and transplanted to New York City might grow up as a typical New Yorker. But even assuming this is true, it of course begs the question by assuming that all that really matters is the 'deep' biology. This, and the argument that deep biology (genetics) takes a very long time to change significantly (a premise increasingly questionable in the light of epigenetics), are what underlie the argument for Evolutionary Psychology that I have been particularly concerned to refute.

One way to see the power of cultural evolution, on the other hand, is to stress its role in the reconstruction of the human niche. Let us focus on a very small episode of cultural evolution, say that which has occurred in Europe over the last two centuries.

Human behaviour is, I suppose, significantly different between the ends of this period. At the beginning of the period a much higher proportion of people were occupied with agricultural work of some kind, and the kind of agricultural work was mainly different from anything available today. The affluent travelled in horse-drawn vehicles, the rest on foot; most people stayed much closer to home than they do today. No one watched television or played video games. Generally people did different kinds of work and entertained themselves in different ways.

The biologically inclined will tend to acknowledge these differences, but stress that both then and now people had sex, raised children, competed with one another for status, and so on; in these fundamental ways nothing changed. But as these activities do not even distinguish us from apes, or indeed most other animals, it is clear that a rather finer grain of description is relevant. No doubt there are finer grains of description than these that will count the populations in question as similar. One of the deeper problems in this area is between any two groups of organisms there will be similarities and differences. As a population evolves new differences will appear and old similarities will disappear. What constitutes significant, interesting differences that should be marked by the term "evolutionary change"? I do not see how any answer to this could be given by Nature; it is up to us how we use this term. We might decide by fiat to apply it only to genetic changes, but if we did we should be careful not to infer anything from this about the importance of different kinds of change in nature. My point is just that in terms of changes that are of interest to us, very considerable differences occur to humans in relatively short periods of time, and whether or not these involve genetic differences may be an interesting question in its own right, but has little bearing on how significant the changes may be.

But to return to the main thread, I wished to emphasise particularly the ability of cultural evolution to transform the developmental niche. And here, at least in contemporary developed countries, it seems clear that humans have learned in quite recent time, to construct a remarkably novel environment for the development of their young. Our homes are heated, plumbed with incoming water and outgoing waste, and provided with electricity. Entertainment arrives through the air or in subterranean cables at specially made receivers that project images of musicians, actors, etc. Our food comes from supermarkets, sometimes in cans or ready-frozen meals. If our health is threatened we are moved to special facilities where specialists intervene to restore our proper functioning. Massive infrastructures facilitate our movement through space and our communications with one another independent of physical proximity. And most importantly of all in the present context, other locations house specialists who impart to the young some of the vast body of information necessary to thrive in these very complex environments. All of this is entirely banal. What is curiously often overlooked, however, is that these prodigious changes to the human environment, concretisations of our rapidly evolving culture, profoundly affect the developmental resources available to growing humans. For that reason their introduction should be seen as representing major evolutionary change.

One simple example may further illustrate the point. The mobile phone did not exist when I was a child. In fact it is for hardly more than a decade that it has been omnipresent, a mandatory accoutrement for everyday life in developed countries. And whereas it may seem only more or less mandatory for people of my generation, for those aged, say 10-20, it is as unthinkable to be deprived of one's phone as to wander the streets stark naked. Most teenagers move through the world, by virtue of this technology, in a continuous dialogue with a group of friends who need not be in any physical proximity. In fact the virtual community seems far more salient than the contingency of physical proximity, very probably the cause of considerable conflict in spaces such as train carriages, in which an older generation continues to see physical proximity as a decisive basis for at least polite interaction. It is not, therefore, merely behaviour that has changed for those who have grown up with the mobile phone, but the entire experience of social space, transformed from a direct function of physical space, to a virtual space within the voluntary control of the individual. Needless to say, the rate of such evolutionary change is entirely different from the genetic change so beloved of neo-Darwinists.

4. Human Nature

It is now possible to see why I want to deny that there is any such thing as human nature, when this is understood as something constant through the history of the species and across members of the species. By human nature, therefore, I shall in what follows mean only the nature of a particular human, or the nature typical of, or average for, a particular group of humans. Human nature as a population average can evolve rapidly over time; and individual human nature can vary considerably within a population at a time. The reason for this is not, as Evolutionary Psychologists imagine to be asserted by the 'Standard Social Sciences Model' (Barkow, Cosmides and Tooby 1992), that human nature is something superficial and trivial that can be written on the blank slate of the human mind by any ambient culture. On the contrary, it is a consequence of the complexity of the way human nature develops, the multiple causal factors involved in the progression from zygote to mature human with a relatively settled set of behavioural dispositions[6]. The complexity of the process and the number of factors that influence it explain both these dimensions of diversity. Evolution can change the characteristic, or typical behaviour of a population through the accumulation of (at least) genetic, epigenetic, and cultural changes. It is safe to say that in recent human history the last mentioned has been the leading driver, as cultural evolution has drastically altered the species-typical developmental niche. It may well be that some of these changes have become more firmly entrenched through parallel epigenetic or even genetic changes.

It is equally clear that recognition of the variety of factors involved in development makes possible a diversity of individual outcomes within even quite narrowly defined populations. Everyone recognises that there is genetic diversity within most populations and specifically among humans. A great and currently increasing quantity of work goes into correlating these genetic differences with phenotypic differences. A major form of contemporary biomedical research is the genome wide association study (GWAS), which uses the very large volume of genomic data we now have about human populations to find correlations with medical outcomes—physiological and psychological disease. I don't mean to raise an objection to such studies, which may well succeed in usefully identifying causal factors involved in pathological processes. However, as everyone involved in such research is aware, this is a hardly a search for sufficient causes. GWAS will at best provide clues to the detailed causal processes involved in pathology.

A good indication of the difficulty can be gained by reflecting briefly on by far the strongest known correlation between a genomic factor and a psychological pathology,

[6] I say *relatively* settled. In fact human development should be seen as a process that continues from fertilisation of the egg until death. It is probably safe to say, however, that dispositions are a good deal more fixed in the last few decades of this process than in the first.

a correlation far too well known to require anyone to launch a GWAS, namely the genetic cause of violence. The cause in question is, of course, the Y chromosome. Possession of this genomic feature increases the probability that a person will commit a violent crime by a factor of 5 to 10, the sort of finding which would be likely to achieve considerable publicity if it related to schizophrenia or cancer, say. The example can usefully highlight a number of quite general, mainly fairly obvious, points.

To begin with the most obvious point, a genetic cause is not generally a sufficient cause. Most men do not commit violent crimes. And it is not a necessary cause. 10 to 20% of violent crimes are committed by women. Like any other human trait, the disposition to violence develops in interaction with a range of other factors, for example those explored by social scientists interested in the causes of violence. The variation in these factors, presumably, explains the wide differences in the prevalence of the trait in different social contexts[7]. But saying all that is not to deny that the genetic difference plays a role. This might mean that in all actual and most imaginable social contexts there would be a predominance of male over female violence. It is easy enough to imagine differences in hormone levels, the autonomic nervous system, or even more specific cognitive biases, that could result in such an enhanced disposition. And these differences may even be explained, in part, by the evolutionary scenarios offered by Evolutionary Psychologists.

But the point I want to emphasise most strongly with this example is that even with such a robust phenomenon and a well-grounded belief in causal relevance, the usefulness of this genetic information is very limited. No one seriously advocates addressing the social problem of violence by universal incarceration, elimination, or selective abortion of fetuses with Y chromosomes. This is a relevant factor in that causes of male and female violence may well be significantly different, and because it alerts us to the greater importance of focusing on the causes of male, rather than female, violence. But any practical impact on the social problem will require understanding in real depth and detail the processes that lead some people with Y chromosomes (and a smaller number without) to end up as adult humans with an atypical tendency to resort to violence.

[7] For an analysis of some factors affecting the prevalence of domestic violence, for example, see Archer (2006).

One final point should be added with respect to the causally complex situation just described. There is a widespread if inchoate intuition that there is something specially deep and important about genetic causes. One thing that may contribute to this is a sense of their immutability: apart from some very recent and still quite unreliable technologies, there is nothing much we can do about genetic causes. But for the multicausal situations I have been considering, this is a reason for inferring the lesser importance of these causes. A long tradition of philosophical analysis has considered the question how we pragmatically distinguish a particular factor as "the cause" from a complex causal nexus (Mackie 1974). A central conclusion is that we distinguish a fixed background (standing conditions) from the distinguishing and not necessarily expected factor. Thus, in one classic example, an electrical short circuit rather than the presence of oxygen is offered as the cause (and, more obviously, the explanation) of a fire in the hay barn. The short circuit is the "difference-maker"; the oxygen is present just as it is in countless other non-burning barns[8].

The preceding idea alerts us to the importance of being very clear about the scope of the questions we are considering. If we are interested in the general phenomenon, why men are more disposed than women to violence across a whole range of social contexts, then it may be that some physiological upshot of the Y chromosome is what makes the difference. But for most explorations of violent human behaviour being male is a background condition, and we are interested in causes that make the difference between violent and non-violent men. Similarly when we are interested in cross-cultural differences we will look at the differences between cultures, and the distribution of XX and XY karyotypes will be a background condition. As with almost any variable human trait, there are likely to be other genetic differences that affect the trait to some degree. Experience so far, however, suggests that it is most unlikely that there will be anything with an effect comparable in size to that of the Y chromosome.

Human Autonomy

[8] A sophisticated development of a similar idea, but based on the idea of the potential manipulability of a cause, has been developed by James Woodward (2003). However, for present purposes the simple idea outlined in the text will be sufficient.

I have said a good bit about the genetic determinism which is still such a regrettable concomitant of much thinking about genetics. I want to finish on a rather different topic, determinism in general and the worries that this has long engendered about human autonomy. Space will not permit a detailed defence of my rejection of the still widely endorsed deterministic perspective[9]. What I would like to argue is that, contrary to a common philosophical assumption, rejection of the deterministic worldview does in fact have significant consequences for our view of what it is to be human.

Outside the philosophy of science it is still widely assumed that a commitment to determinism is an inescapable concomitant of taking scientific knowledge seriously at all. However, it is a quite different story among philosophers who have attempted to engage seriously with the contents of scientific belief. Philosophers of physics have, of course, given up on classical ideas about determinism since the general acceptance of quantum theory, though it is still often supposed that determinism can somehow reappear unharmed at the macroscopic level. To this I comment only that such containment of indeterminism seems incredible. Schrodinger's cat may or may not be around to kill the mouse that would have moved the nail that stuck in the shoe of the horse that would have…The fact that there are deterministic processes that emerge at the macroscopic level cannot exclude the amplified effects of microscopic events that are not deterministic from interfering with the orderliness of the macroscopic sphere.

Philosophers of biology are perhaps not typically much exercised by this question since, on the whole, they have now given up on the reductionism that, it was once imagined, might import determinism from the microscopic sphere. On the face of it the regularities that biologists discern or the models that they construct look anything but deterministic. Biologists, it is true, do tend to assert their commitment to determinism and reductionism, but it generally turns out that these doctrines are understood as methodological commitments rather than metaphysical doctrines. As such—assume that phenomena of interest have causal explanations; look for underlying mechanisms—these commitments are surely unexceptionable. On the other hand, the rise of systems biology in the last five years or so has brought a good deal of discussion of holism, emergence, and related ideas to the forefront of

[9] For this see Dupré 1993, part 3.

theoretical biological thought (Boogerd et al. 2007; O'Malley and Dupré 2007). Picking up on an idea promoted long ago by Donald Campbell (1974), biologists and philosophers have even started to consider seriously the idea of downward causation, the causation of the behaviour of parts by the whole.

But here I don't propose to review the arguments for or against these positions, but want only to consider whether the rejection of determinism and physicalist reductionism, together with the acceptance of emergent properties or downward causation would make any significant difference to the way we should think about the nature of the human. In particular, can these ideas begin to make sense of human autonomy, or freedom of the will? I want to argue against the still orthodox assumption that such issues are irrelevant to the issue of free will[10].

The reason why these issues are generally thought to have little relevance to the question of free will is straightforward. It is naturally supposed that the alternative to determinism is indeterminism, lack of causality, or randomness. But the concerns that people have about determinism, that it may seem to imply lack of control over or responsibility for, one's actions, are hardly ameliorated by the thought that they are randomly generated. As philosophers since Hume have observed, it is a rather more attractive thought that they are caused by one's beliefs and desires.

That propositional attitudes such as beliefs and desires explain actions is largely uncontroversial, and most philosophers now hold that they do this because they cause actions. But what does this mean? One common picture is that beliefs and desires are states of the brain, and that these initiate signals down nerves which, in turn, cause the motions of parts of the body that constitute actions. But this, of course, is a picture that fits naturally with the philosophical vision of microscopic causal transactions to which the apparent actions of macroscopic agents are mere epiphenomena. A quite different picture begins with the rejection of the assimilation of beliefs, desires, and so on, to states of the brain. This rejection is often motivated nowadays by externalism, the view that a belief, for example, depends for its identity on things in the world beyond its human possessor. The alternative position, however motivated, is that believing that p, say, is a property of a whole human, and that the reification of a belief required in locating it in the brain is wholly unwarranted. If a belief, or an

[10] Such an argument was presented in greater deal in Dupré, 2001, ch. 7.

instance of believing, is indeed a property of a whole human, then its causing of the movement of a part may be seen as a case of downward causation, the influence of the whole on one of is parts. If this seems metaphysically extravagant, note that the familiar philosophical example 'I raise my arm', unless the I is a Cartesian ego or its current neurophysiological analogue, is an example of a whole ('I') acting on a part ('my arm'). So the rehabilitation of downward causation is an important step in beginning to make sense of the human agent as something causally efficacious, capable of making things happen, rather than merely an epiphenomenon of constituent microscopic happenings.

This will all continue to seem to most philosophers metaphysically extravagant in comparison to the alternative story at the microphysiological level in which a complex array of physical particles in my brain acts on another such array in my arm. If a belief is more than an array of stuff in my brain, then it may still only be that part of the belief that does the actual neurophysiological causing. Again, the description of all this in terms of whole person agency may seem epiphenomenal.

But why does this alternative picture looks so much more philosophically plausible (if it does)? The answer, I think, is that many of us are still captivated by a neo-Laplacean picture in which everything really happens at the microphysical level, which is causally closed and complete. And this picture cannot escape the implication that <u>everything</u> above the microphysical level is merely epiphenomenal. If the parts of a thing have their behaviour determined by microphysics then so must the behaviour of the composite thing be determined. Any appearance that it has casual powers of its own is illusory. It is no more nor less necessary to appeal for causal explanation to the properties of my mental states than it is to the liquidity of water or the motion of tectonic plates. To a LaPlacean calculator both are just the upshots of countless microscopic movements.

The resolution of this problem, in my view, lies with abandoning the assumption of the causal completeness of the physical. Although I cannot offer detailed arguments here against this assumption, I shall try to give some sense of why I think it can safely be abandoned. The microphysical determination of everyday events is, at least, hardly something open to casual inspection. It is, on the contrary, a metaphysical assumption, and once open to serious consideration it is, it seems to me, a highly implausible one.

Abandoning the assumption of causal completeness is giving up the idea of the universal reign of law, the assumption that everything happens in accordance with some universal causal regularity. Speculatively, I suggest that this is an idea grounded in the prescientific conception of law as the edict of a supreme lawgiver. Certainly God should be capable of regulating every event, however minute; whether Nature could or should be expected to accomplish the same feat is another matter. Reflection on biology, on the other hand, should make such universal regularity quite implausible. Not only are life processes constantly beset by at least the appearance of irregularity and unpredictability but, more significantly, regularity is won with great difficulty and ingenuity. The mechanisms that make possible the regularities that constitute the persistence of living things are more astonishing the better we come to understand them.

Of course, this will seem entirely beside the point to someone convinced that universal law reigns at the microphysical level. My point so far, however, is not to show that biology refutes microphysical determinism, but that it is incumbent on the determinist to offer an account of the relation between physical and biological phenomena. This account will be reductionist, but not in the sense of explaining biological laws, since in the determinist’s sense there are none, but in the sense of explaining in principle every specific biological event. Irregularity is then an expected consequence of the microphysical heterogeneity of biological entities and processes. But then it appears that the determinist has explained too much; for biological regularities, the regularities that make possible the persistence of biological processes, while far from universal, are highly impressive and certainly in need of explanation.

I will not attempt to show that the determinist can’t meet this challenge, but rather suggest that this is a point in the dialectic at which an entirely different perspective begins to look much more attractive. This is the idea that causal regularity is in fact a rare and precious thing, bought at great cost in energy or ingenuity. Biology, from this point of view, is not so much about tracing out how the causal regularities at the microphysical lead deductively to the (partial) regularities at the biological level, but rather is a matter of seeing how the causal properties of physical entities are employed to constrain events and maintain the persistence of complex systems. New properties, put to such purposes, are constantly emerging as more complex entities come into being. The complex macromolecules employed by living systems have properties—catalysing other reactions, forming structures with strength, elasticity, etc., neutralising alien biological entities, and so on—that are a result of their particular complex structures. The combination of these new causal capacities in turn create systems with entirely new (emergent) capacities—the abilities to fix atmospheric nitrogen, say, or run down and consume prey—capacities that contribute to the persistence of the highly complex systems of which they are part.

In this light, now consider the human developmental system, surely the most complex system in our experience. This deploys the causal capacities of humans and the countless artefacts they create, and perpetuates the survival of the human lineage and the structures that serve that survival. Central to this system is the human mind, an abstraction that I take to refer to the densest concentration of causal capacities in our experience, the capacities exercised in human intelligence, and without which it would be inconceivable that the human developmental niche could be maintained and indeed give rise to ever larger numbers of humans, in turn creating a set of problems that human intelligence may or may not ultimately succeed in solving.

This then, to summarise, is the major step towards an understanding of human autonomy made possible by the rejection of determinism, and indeed leads to a far more satisfactory metaphysics of human nature. Causal order is not something found saturating every part of the universe. On the contrary it is something quite rare and specific in its locations. It is found in the simplicity of massive physical processes such as are studied by astronomers; it is created with great difficulty in the complex, elaborately controlled and isolated machines built by physical scientists; and most spectacularly, though very differently in form, it is found in living beings.

If there is a scale of nature, it is an increase in the causal powers, the construction of causal order and regularity. One respect in which the human mind constitutes a further step in this scale is because it involves a new level of capacity to transform the world beyond the organism. Humans, in my view, are the densest concentrations of causal capacities, or causal power, in our experience. The niches we have constructed for ourselves—warm and sheltered housing, landscapes dominated by edible plants and docile and tasty animals, roads and machinery for moving ourselves about, and so on—are remarkable testimony to our causal potency. But still, it may be asked, does this amount to real autonomy?

How much autonomy do we want? As I have already mentioned, we don't want to conceptualise ourselves as random action generators. And we do want our actions to be properly related to our mental states, our beliefs and desires. Is there any sense that we can be said to choose our beliefs and desires? Or if we cannot be said to choose them, can we at least in some sense own them? It seems to me that we can do so to the extent that we organise our lives in pursuit of consistent goals or principles. If I simply act in pursuit of whatever passing whim is uppermost at the moment I exhibit no more causal power than any other animal. If I choose to build a bridge, write a book, or cook dinner, and subordinate my choice of actions to this decision, I exercise to a greater or lesser degree a distinctively human ability to shape the world[11]. In the social realm, the ability to conform to principle, above all moral principle, is the kind of regimentation of behaviour that constitutes a uniquely human achievement. And in the terms I have just been employing, it is through such plans or principles that human minds are able to impose regularity on the world. Clearly some acknowledgement of Kant is in order here, though the view I am proposing is a lot less arduous in its account of the kind of principle that might constitute freedom. Rather than one rationally grounded canon of morality that constitutes an action as free or unfree, I would rather suggest a spectrum of degrees of causal efficacy, ranging from the person described by Harry Frankfurt (1988) as the wanton, to those most efficacious in affecting the world through the subordination of their immediate desire to goals and principles[12].

[11] I take it that this has a lot to do with the importance that many thinkers, perhaps most famously Marx, have attached to the autonomy exhibited in labour. John Ruskin's view of the Gothic cathedral is a powerful if romantic expression of the point.

[12] I have described my view in the past as opposed to compatibilist views of free will. Just before sending this paper to press I head John Perry's Dewey Lecture at the 2010 American Philosophical Association Pacific Division meeting, which convinced me that this opposition was mistaken, provided compatibilism was understood as compatibility not with determinism, but merely with naturalistic causality. Indeed, rereading the present paragraph, and reducing these slightly portentous plans and principles to the beliefs and desires that represent them on particular occasions of action, I suspect it promotes a form of compatibilism quite consistent with that which Perry persuasively articulates.

There are of course many big questions unanswered. Can we choose what kind of person we will be, and if so when and how? Is it better to be causally efficacious than merely content (Socrates or a satisfied pig)? And no doubt many more. My point is only that inverting the familiar question about human freedom, might humans be an exception to the otherwise universal rule of law to the almost diametrically opposite question, might humans be an extreme exception to an otherwise largely disordered and unruly universe, opens up a quite different, and perhaps more productive, set of questions.

Conclusion

This essay has had more to say about what human nature is not than what it is. But this is no accident. Ultimately my central contention is that human nature is open. Humans have powers to shape the world and themselves which, while no doubt not without limits, have surely not yet encountered those limits. Hence I started this essay with my opposition to an influential perspective that not only insists on the importance of human nature, but offers us a methodology for determining exactly what it is. Unfortunately this methodology is grounded in an obsolete and simple-minded view of evolution. Or perhaps I should say, “fortunately”. For it seems to me that the narrow view of human nature presented by Evolutionary Psychology is not only mistaken, but is also potentially bad for us. A limited view of human possibility must inevitably narrow human aspirations. And though it should perhaps also be said that aspirations can be bad as well as good, so that the openness of human possibility, of possible changes to the human developmental niche, can cut both ways, I am sufficient of an optimist to feel that opening up a better future is worth the risk of making possible one that is worse.

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